Strengthening Urban Resilience: The Case for Maharishi Vedic Architecture

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INTRODUCTION

Fourteen years ago, United Nations Habitat (2006) predicted the world would soon cross an unprecedented threshold: more people would live in urban areas than outside them. "Sometimes it takes just one human being to tip the scales and change the course of history", the United Nations posited in 2006; "At some point in the year 2007, that human being will either move to a city or be born in one. The event itself will go unnoticed but demographers watching urban trends will mark it as the moment when the world entered a new urban millennium" (p. iv).

At the time, Crane and Kinzig (2005, p. 1125) suggested this transition to the new urban millennium would be profound and most likely irreversible: "For the first time, more people are living in cities than outside them. Now and into the future, we will be *Homo urbanus*: the city dweller". By 2018, the percentage of people living in cities had grown to 55.3%; by 2030 that percentage is expected to reach 60%. By then, one in every three people on earth will be living in a city with at least half a million inhabitants, and cities of one million or more inhabitants will have grown in number from 371 in 2000 to 548 in 2018, with a projected 706 cities of more than one million inhabitants by 2030 (United Nations Habitat, 2018).

Indeed, virtually all future global population growth is predicted to take place in urban centres (Commonwealth Scientific and Industrial

Research Organisation, 2007), with a projected 6.5 billion people living in cities by 2050 (McPhearson, Haase, Kabisch and Gren, 2016, p. 566). Moreover, as highlighted by Jutersonke, Muggah and Rodgers (2007, p. 162):

> the emergence of massive urban sprawls has blurred basic distinctions between urban and rural and has yielded a new vocabulary. Today, demographers and urban planners talk of 'megacities' of more than eight or ten million inhabitants, and even 'hypercities' or 'megacities' of more than 20 million, virtually all of which are located in the developing world.
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> For example, by 2025, Dhaka will probably surpass 25 million inhabitants—up from 400,000 in 1950; Karachi will grow to 26.5 million—up from 1 million; Jakarta is set to attain 24.9 million—up from 1.5 million; and Mumbai is to reach 33 million people—up from 2.9 million. By 2005, these megacities (20 in total) already accounted for nine per cent of the world's urban population.

In parallel to these events and trends, the World Wildlife Federation (2009) showed that while cities cover less than 1% of the planet's surface and are home to more than 50% of the world's population many are facing rapid and unsustainable growth; many others are already in steady decline. Taken together, cities and urban areas use 75% of the world's energy and are responsible for 75% of global greenhouse gas emissions.

Such rapid and unsustainable growth has a direct impact on food and water security and on cropland encroachment. Thus, "urban expansion directly affects the croplands surrounding cities and indirectly impacts farmers' welfare, food systems, and the natural environment" (Ciu et al., 2019). For example, in China's so-called "unsustainable landscape" (p. 1) of accelerated urbanisation, which "has taken place on some of the most productive croplands and threatens future cropland supply" (p. 2), Ciu and his colleagues have found that "former croplands contributed more than 70% of new urban areas" in China between 1990 and 2015 (p. 15).

Moreover, the Millennium Ecosystem Assessment (2005), a review by 1,300 scientists from around the world, found during this period that some 1.1 billion people, many living in urban environments, still lacked access to clean water and lived on less than $1 per day; more than 2.6 billion people also lacked access to basic sanitation. Nevertheless, the United Nations predicted that by 2030, nearly two billion new people will

move into settlements not yet in existence (United Nations Department of Economic and Social Affairs, 2005) and these new urban settlements would be predominantly located in the developing world (United Nations Habitat, 2006).

This trend will place an enormous and growing pressure on already failing infrastructural systems, and physical and natural resources in these developing countries will be stretched to breaking point in the coming decades. The phenomenon has already been called the "tragedy of urban infrastructure" (Dentinho, 2011). Thus, McPhearson et al. (2016, p. 566) argue that

> cities are hotspots for global change. Climate change, urban population expansion, and development pressures are already affecting urban areas and their residents and will pose a range of challenges to urban planning and decision making in the future. For example, citizens are likely to experience climate change impacts most directly in cities with key impacts including rising temperatures and heat waves, reduction in air quality, as well as extreme rainfall events and biological responses to a changing climate.
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> Urbanization is an ongoing and dynamic process related to many interlinked pressures, such as land conversion, soil sealing, densification of built-up areas, increases in traffic and air pollution, and decrease in urban green spaces, all of which pose significant challenges to ecosystem functionality and human well-being around the world.

This paper introduces some of the adverse side effects of these rapid rates of urbanisation as currently experienced throughout the world. Urban planners and ecologists have suggested that these problematic side effects have resulted not only from urbanisation, but also from the societal impacts humans have had on their natural and built environments and the changes they inflict on the biophysical cycles and ecologies of the planet. These impacts and changes suggest a need for a dramatic shift in human consciousness and the built form of towns and cities.

However, according to some social geographers, "urban agglomerations are not necessarily a source of problems but offer the integrative geographic action platform for creative solutions and new opportunities" (Nijkamp & Kourtit, 2013, p. 292). To that end, this paper

briefly introduces Vedic Science as it has been presented by Maharishi Mahesh Yogi, and considers its important relationship to urban resilience, especially the integrative roles that Maharishi Vedic Architecture, Maharishi Vedic Garden Cities, and Maharishi Vedic Gardens might offer in restoring balance to our built environments and in developing urban resilience.

Such roles may be particularly important as populations rapidly expand and potential imbalances in nature and in human life pose existential threats to sustainable habitation, and thus may contribute directly to humanity avoiding what Yigitcanlar, Foth and Kamruzzaman (2018) call "urban ecocide" and what Pain (2019, p. 385) refers to as "chronic urban trauma" and the need for a "post-traumatic city" (p. 386).

GLOBAL URBANISATION

The 21st century has been dubbed the 'urban century' by social geographers and demographers (e.g., Bandarin & van Oers, 2012; Heynen, 2014). As Nijkamp and Kourtit (2013, p. 291) have pointed out in the context of a so-called 'new urban Europe', "Modern cities in the open European space-economy are powerhouses of creative ideas, smart technologies, sustainable developments and socio-economic wealth. They play a pivotal role in the future of an urbanized Europe, but they are also confronted with grand challenges, notably far-reaching demographic transformations, environmental decay and climatological change, unequal social participation, and ever-rising mobility trends".

These so-called 'grand challenges', sometimes called 'wicked problems' when generally termed (Head, 2019) or 'wicked urban waste problems' when specifically applied to city waste (e.g., Chan, 2016), include a range of impacts from urbanisation and industrialisation, the latter directly associated with and embedded within urbanisation. Evidence of such human impacts on soil, as just one recent example, has been provided in the Australian context (Fergusson, 2017). For these reasons, the International Commission on Stratigraphy and other working groups of scientists have explored the proposition that mankind has entered a new geological period, a so-called *Anthropocene Epoch* (Waters et al. 2014, 2016; Zalasiewicz, Williams, & Waters, 2014).

This period, apparently beginning with the Industrial Revolution in the late 18th century, is marked by not only a rapid acceleration in human consumption, waste generation and urbanism with their concomitant declines in biodiversity, but is also characterised by the ubiquitous spread

of man-made artefacts, such as plastics, petrochemicals and concrete, all of which are said to have had a significantly profound and irreversible impact on the earth's ecosystems and fragile ecologies. Social geographers have reasonably concluded that mankind has become a geological force capable of altering landscapes and environments on a planetary scale (e.g., Fischer-Kowalski, Krausmann, & Pallua, 2014; Standish, 2015). Current thinking puts global urbanisation at the heart of the Anthropocene Epoch (e.g., Larjosto, 2020).

Australia's Commonwealth Scientific and Industrial Research Organisation (2007) states that urban landscapes are changing faster than we can understand the diverse forces conditioning these possibly irreversible changes: they are dynamic, interlinked, and complex. As McPhearson et al. (2016, p. 566) explain: "Cities and urbanized regions are complex, dynamic, and highly integrated systems linking social, ecological, and technical infrastructure domains in ways that create deep challenges for good governance, policymaking, and planning". Urban planning, the process developed and applied to manage urbanisation, on the other hand, is relatively static and slow moving. Moreover, because the dynamics of cities are non-linear, their problems cannot be solved by linear planning methodologies. Walker, Holling, Carpenter and Kinzig (2004) have therefore pointed out that change is essential, adaptation is crucial, and the past is the past.

Bateson (1999) had earlier pointed out in his *Steps to an Ecology of Mind* that causal oversimplification is the greatest burden of an occidental epistemology and mindset. Our accepted scientific model is based, according to Bateson, on reducing systems to a single variable that can be quantified, measured, and tested. However, this standard scientific method, for all its valuable attributes, does not (and cannot) adequately represent, let alone understand, complex, interlinked, and dynamic systems, which produce uncertain, non-linear change simultaneously across multiple disciplines.

In fact, it can be argued that conventional scientific knowledge and its linear framework of deduction have directly contributed to the current biophysical crisis of global urbanism and it is therefore highly unlikely that, on its own, it can provide an adequate solution to this crisis. As Levin, Cashore, Bernstein and Auld (2012) concluded, a wicked problem is characterised by a number of features, not the least of which suggests: 1) time is running out to find a solution to the problem; 2) those who caused the problem are also the ones charged with trying to solve it; 3) the authority needed to address the problem is weak or non-existent; and 4)

responses to the problem are irrational, lack evidentiary support, and dangerously discount the significance of the problem's wickedness.

"These four features combine to create a policy-making 'tragedy' where traditional analytical [and planning] techniques are ill equipped to identify solutions, even when it is well recognized that actions must take place soon to avoid catastrophic future impacts" (p. 123). Thus, McPhearson et al. (2016, p. 566) state: "Advancing urban sustainability and resilience agendas requires expanding the scope of inter- and trans-disciplinary approaches, moving beyond the historically separate social-ecological and socio-technical approaches to jointly study social-ecological-technical infrastructure systems in cities".

Indeed, McDonald (2008) emphasised that we need a multidisciplinary, evidence-based philosophy and methodology to adequately deal with and account for the significantly profound, but highly complex and dynamic, changes faced by humanity. That is why Salaj and Pompe (2014) have advocated for recognising the "interactivity, multidisciplinarity, synergy and interdependence…that are clearly intertwined with managing every responsible city and its leaders".

I therefore conclude that urbanism is overdue for a major philosophical and methodological transformation, a transformation that changes the fundamentals of thinking about dynamic urban environments, a transformation of consciousness which will sustainably lead us out of this most precarious of situations. The transformation, to be profound, dynamic, and yet effective, must be a shift in not only the approaches and methods to, but also in the ways of thinking about, urbanism and urban environments. Such questioning of the viability of densely populated urban centres in light of the global COVID-19 pandemic has already begun (e.g., Cotella & Brovarone, 2020). In only this way, it can be argued, will humanity create and establish global urban resilience and a sustainable urban future for the world's cities and their inhabitants.

GLOBAL URBAN RESILIENCE

Urban resilience has been defined as the degree to which a city can tolerate alteration before reorganising around a new set of structures and processes (Commonwealth Scientific and Industrial Research Organisation, 2007, p. 8). Walker and his colleagues (2004) have previously provided a valuable classification system for understanding and managing the concepts associated with urban resilience. They have shown there are three separate but interrelated attributes of social-

ecological systems (SESs) that determine the future trajectories of cities: resilience; adaptability; and transformability.

Consistent with the CSIRO, Walker and his colleagues maintain *resilience* is the capacity of a system to absorb disturbance (or alteration) and reorganise while undergoing change in order to retain its essential sameness of function, structure, identity, and feedback mechanisms. Feedback mechanisms, which allow the system to self-adjust its functions, structure and identity, have four essential operational characteristics: latitude; resistance; precariousness; and panarchy (i.e., the frameworks which account for the stability and change characteristics of complex systems). *Adaptability* is the capacity of humans in the system to influence resilience (in an SES, the role of humans is essentially to manage and balance the socio-ecological system), while *transformability* is the capacity of the system to alter and/or reorganise to create a fundamentally new system when ecological, economic and/or social structures and demands make the existing system untenable. Each attribute of resilience, adaptability and transformability has inputs, throughputs, and outputs, as well as outer environmental demands (such as laws, licenses, and external competition) and porous system boundaries, typical of all systems.

Walker and his colleagues maintain the stability dynamics of linked systems of humans and nature emerge from these three complementary attributes. They show that systems consist of nested dynamics operating at various organisational scales, ranging from households to villages/cities and ultimately to nations. Because human actions dominate SESs, adaptability of the system is mainly a function of the social component; that is, individuals and groups acting to manage the system. Walker et al. show that the collective capacity of the social component of an SES to manage resilience intentionally, determines whether it can successfully avoid crossing into an undesirable domain (e.g., in its most extreme manifestation, such an undesirable state means 'urban ecocide') or, if it does adapt, restore it to a new, but more balanced and desirable state.

Walker and his colleagues go on to assert that resilience is not always a good thing: sometimes change is desirable, generally at larger scales. At such times, effective management requires overcoming the resilience (or resistance) in the system to precipitate constructive changes at these scales. To this end, Walker and his colleagues ask two pertinent questions: How can society develop transformability; and how can we foster or maintain the flexibility required to cope with unforeseen challenges?

Walker and his colleagues speculate that attributes required for transformability and flexibility will emphasise social traits like: novelty,

diversity, and organisation in human capital (i.e., diversity of functional types, such as different kinds of education, expertise, and occupations); strength and variety in institutions (akin to why biodiversity is important in ecology); and speeds and diverse kinds of cross-scale communication, each occurring both within and between systems. In the context of building global urban resilience, these organisational, social and governance issues require urgent attention.

Furthermore, the Millennium Ecosystem Assessment (2005) examined how changes in ecosystem services might influence human well-being. Human well-being and quality of life are assumed to have multiple constituents, including secure and adequate livelihoods, food at all times, shelter and clothing, health (including feeling well and having a healthy physical environment, such as clean air and clean water), good social relations (including social cohesion, mutual respect, and the ability to help others and provide for children), and freedom of choice and action (including the opportunity to achieve what one values doing and being influenced by education). Such constituents of well-being, quality of life, and urbanism, as they are related to functionings and capabilities in the 'Capability Approach', have been discussed in more detail elsewhere in relation to Maharishi Vedic Science (Kettle, Wells, & Fergusson, 2017).

Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable time in human history (as evidenced by stratigraphy, and hence the phrase 'Anthropocene Epoch'). The changes being made by humans are increasing the likelihood of nonlinear changes in ecosystems (including accelerating, abrupt, and potentially irreversible changes) that have important consequences for human well-being and quality of life. These changes have in many cases resulted in a substantial and largely irreversible loss in the diversity of life on earth. Fifteen years ago, the Millennium Ecosystem Assessment showed that this trend, along with its attendant social and environmental problems, unless addressed, will substantially diminish the benefits that future generations can obtain from ecosystem services and the natural environment, including from the air, water and soil. The Millennium Ecosystem Assessment's sub-global assessments also found that spiritual and cultural values associated with ecosystem services were as important as other services for many local communities, both in developing countries (e.g., the importance of sacred forest groves in India) and industrialised ones (the importance of city parks and green spaces, for instance).

Wealthy populations are not insulated from the degradation of ecosystem services. The physical, economic, and/or social impacts of

ecosystem service degradation may cross racial, demographic, and social boundaries. Obvious examples are dust storms, uncontrolled soil erosion and forest fires, but also changes that contribute to greenhouse gas emissions and hence to global climate are changes that affect all countries without concern for race, gender, or social standing. Degradation of ecosystem services exacerbates poverty in developing countries, contributing (or even directly leading) to the outbreak of conflicts or the large-scale migration of refugees, as have been seen recently with the outpouring of refugees from Syria, Iraq, Afghanistan and elsewhere in the Middle East (Freedman, 2016).

The earlier Millennium Ecosystem Assessment research also showed it is important to recognise that significant differences between the roles and rights of men and women in many societies lead to the increased vulnerability of women and children as a result of changes in ecosystem services (e.g., Hernández-Delgado, 2015). Thus, Tyler et al. (2010) define the key elements of a global urban resilience framework as *urban systems* and *social agents*.

Urban Systems. Urban systems include ecosystems, infrastructure systems and institutions. Most importantly urban systems are a direct expression of local and national knowledge, and knowledge of the built form and its impact on human well-beings are extremely important when examining urban resilience. That is why Sauerbruch (2010) said buildings need to communicate and adapt to the significant paradigm shifts that will be the hallmark of this urban century.

To this end, Edelstein (2008) of the globally distributed International Academy for Design and Health and others (e.g., Maleki & Bayzidi, 2017), are pioneering research into the transdisciplinary field of neuro-architecture to show how the brain responds to space, light and building proportions, including the epistemological implications of the field. This research may well create a breakthrough in understanding the impact of buildings on health and well-being.

Edelstein explains that: "Traditionally the term 'neuro-architecture' is used by scientists to describe the structure of the brain. It also describes a new discipline that unites neuroscience with the experience of architectural environments. The premise of neuro-architecture is to consider how each feature of the environment influences brain processes that in turn alter specific outcomes" (p. 54). These outcomes include, in a hospital environment for example, the "interaction between stress and environmental stimuli such as light, sound, and location [as they] are relevant to patients, visitors, and staff, influencing cardiac and stress

responses as well as cognitive functions such as memory and navigation abilities" (p. 54).

Social Change Agents. The second element of a global urban resilience framework, as described by Tyler and his colleagues (2010), is the presence and central importance of 'resilience agents', or what others call social change agents. Social change agents have the capacity to:

1. visualise and act (i.e., act with resourcefulness);
2. organise and re-organise (i.e., have the ability of rapid responsiveness); and
3. learn (including the ability to learn collaboratively, requiring learners to understand themselves, their own motives and why they hold them, as well as their own thoughts, beliefs, and values. Such social change agents as learners are also required to understand the motives, thoughts, and beliefs of others, as well as merge their own individual interests into a collective aspiration for social well-being and resilient futures).

Social workers are said to be one example of a social change agent, because they have the capacity to "lead and facilitate social change that can have a lasting impact on communities and people" (Nandan, London, & Bent-Goodley, 2015, p. 38). Such agents are said to be social innovators, including both entrepreneurs and intrapreneurs (i.e., proactive social change agents within organisations and agencies who "recognize opportunities, potentials, and meanings from seemingly unimportant events" p. 41). Thus, social change agents have a "desire for autonomy, a need for achievement, an internal locus of control, and a willingness to take risks which create the propensity for social intrapreneurship among individuals" (p. 41).

GLOBAL FINANCIAL CRISIS

Prior to the Global Financial Crisis (GFC), a frequently adopted solution to social inequities in developing countries was to provide a temporary salve through financial aid and other forms of aid assistance. However, the early work of Grimes and Kentor (2003) suggested that the penetration of foreign capital into developing countries also raised CO_2 levels, a phenomenon largely attributed to multinational corporations relocating environmentally unfriendly production methods into countries with fewer environmental controls. Consequently, researchers like Pain (2019, p. 387)

have focused on "the geographical outsourcing of harmful industries and pollution to poorer places that typifies globalisation. Hence slow violence is spatially disproportionate and compounds uneven development, as people, places and ecosystems already made vulnerable become the targets" of "environmental destruction under capitalism; the very slow or delayed repercussions of climate change, pollution and warfare". Therefore, financial aid assistance to developing countries can, in some cases, lead to a compounding of the degradation of fragile ecosystems and the economy.

The GFC precipitated a middle-class credit crisis in many developed countries. Individual credit crises were compounded by the Sovereign Debt Crisis in some developed countries. In the Eurozone, the European Financial Stability Facility (EFSF) was established in May 2010 with the specific goal of preserving financial stability in those Eurozone states facing economic difficulty, with the overall goal to avoid sovereign debt default. This proved to be an extremely complex and arduous ongoing task. As documented elsewhere, the GFC was a significant example of a lack of urban resilience. Indeed, the GFC was triggered by unsustainable urban lending practices in the U.S. (Ciro, 2016; Ma, 2009) and its impacts on post-GFC housing and urban development have been profound (e.g., Day, 2019; Scanlon & Elsinger, 2014).

Certain approaches to urban design, including the design and development of 'knowledge cities', have been advanced as ways to quicker market and economic recoveries after GFC-like financial shocks (e.g., Huston & Warren, 2013). The four cornerstones of such endeavours are, according to Huston and Walker: 1) *Governance* (meaning that power mediated by the rule of law, rather than by decree, with separation of powers dispersed spatially and across institutions); 2) *Social* (i.e., the requirement of a healthy, diverse and well-educated population to fuel a skilled workforce and drive creativity); 3) *Environment* (for example, a city has inbuilt resistance to catastrophic adverse climatic events and uses less per capita inputs and produces less waste and pollution than convention cities); and 4) *Conviviality* (the urban form "must be a mosaic of diverse precincts…pleasant dwelling spaces, where communities transact, play, reflect, dispute or linger…[with] dwelling precincts which are walkable with convenient access to a range of amenities" (pp. 80-81).

Such so-called 'convivial' architecture should, according to Huston and Walker, visually uplift its population. Thus, "whilst resilient systems are devolved and locally autonomous [such cities have] strategies and systems to ensure continuous diffusion and uptake of new sustainable

technologies. Critical elements include strong protection of ecologically important landscapes, smart grids, enhanced public transport logistics and the spread of energy-efficient buildings. [Nevertheless] some cynics are dismissive [of such conceptions of resilient urban designs and town plans]" (p. 81). For a city to be resilient and to cope with (and thereby adapt to) GFC-like disruptions, we can conclude that something akin to a knowledge city-like approach may be necessary as urban environments become especially large and urban populations expand exponentially.

URBAN VIOLENCE AND THE BUILT FORM

The association of urban environments to crime and violence has been well documented (e.g., Davidson, 2019), including the relationship of a city's design to violence against women (Koskela & Pain, 2000), and hence the need to "design out fear" (p. 269). Indeed, according to Koskela and Pain, the notion that "fear of crime can be 'designed out', or at least its worst effects moderated by changing built environments, has underpinned many policy recommendations and initiatives" (p. 269).

For example, Jutersonke, Muggah and Rodgers (2007) had earlier pointed out that large-scale urbanisation tends to be associated with increased rates of armed violence; in fact, they suggest levels of crime appear correlated to a city's size. They note that "urban armed violence forces us to rethink our mental geography of state, society, and governance—including the factors that lead to armed violence and the proliferation and misuse of small arms and light weapons" (p. 163). These factors for Jutersonke et al. include the following: the social dislocation and anonymity of large cities; the opportunities for criminal gain; the relatively low risk of being caught; and the effects of social interaction, especially on vulnerable groups.

Naudé, Prinsloo and Ladikos (2006) also showed that urban density is associated with crime, as concentrations of people lead to competition for limited resources, greater stress, and increased conflict. Norton (2003) pessimistically described megaslums in developing countries as 'feral cities' that are natural havens for hostile systems of governance that pose transnational security threats on a scale hitherto not encountered. Manwaring (2007) also revealed that these hostile systems of governance can result in feral cities being controlled by gangs, organised crime, and contemporary insurgents all with a common denominator: the need to seize political power to guarantee freedom of movement and action, as well as the desired ideological or commercial enrichment. By the time

governance degenerates to a third generation of gang-governed territory, gang leaders begin to act much like the feudal warlords of old.

However, this is not always the case: Tokyo, which has an extremely dense urban form, remains one of the safest cities in the world. It is thought the governance systems of cities and their urban policies thus play a major role in the quality of urban life, but Garfinkel and Skaperdas (2007), when examining the economics of conflict, concluded that little is known about how to reduce, let alone eliminate, conflict in cities.

Manwaring (2007) was much more optimistic when he concluded that violence associated with the protean nature of gangs and organised crime cannot be resolved by firepower or some other muscular state-led response. He says resolution of these problems involves multidimensional activities that can be brought to bear holistically on the causes and consequences of violence. According to Manwaring, success in unconventional urban conflict will ultimately come because of a unified effort to achieve an individual and collective well-being that can lead to sustained societal peace.

MAHARISHI VEDIC SCIENCE AND SUSTAINABILITY

In the aforementioned overview of problems and challenges of twenty first-century urban environments, the following key issues can be identified: 1) the need for social change agents who can visualise a better future and act with resourcefulness, who can organise and re-organise and be rapidly responsive, and who can learn; 2) the need to further our understanding of the relationship between built environments and individual and collective health and well-being; 3) the need to design buildings and cities to better reduce urban crime; 4) the need to make cities less susceptible to economic and governance inequities and inadequacies; 5) the need to reduce the size of cities and organise them in ways which are more sustainable, including making them cleaner and less polluted, while generating less waste, and thereby have a reduced adverse impact on natural environments and ecosystem services; and 6) the need to identify technologies which will take into account the dynamic, non-liner nature of urban change and which will cause sustainable transformability from within the system.

These six imperatives have been directly addressed by Maharishi Mahesh Yogi in the theory and practice of his Vedic Science and technologies and may offer the aforementioned 'integrative action platform for creative solutions and new opportunities'.

Maharishi declares that his Vedic Science is the science of Veda, the science of pure knowledge and its infinite organising power. He explains that "Veda is the structure and function of pure knowledge. It encompasses the whole range of science and technology; it is theory and practice at the same time; it is the structure of total knowledge…the togetherness of the observer, process of observation, and object of observation. Therefore, 'Vedic' includes the whole path of knowledge from the knower to the known—the whole field of subjectivity, objectivity, and their relationship; the whole field of life, unmanifest and manifest; the whole field of 'Being' and 'Becoming'; the whole range of knowledge from its source to its goal—the eternal source, course, and goal of all knowledge" (Maharishi, 1994, p. 5). In Maharishi Vedic Science, this 'integrative platform' upon which creative solutions emerge is the field of pure consciousness, the unified field of Natural Law, the home of all the laws of nature, the source of pure or complete knowledge within the simplest state of human awareness.

The term 'Vedic Science' is therefore used by Maharishi to indicate both the ancient, traditional origins of this body of knowledge (i.e., the Vedic tradition, including all the branches of Vedic Literature) and its modern commitment to experience, systematization, testability, and the demand that knowledge be useful in improving the quality of human life (i.e., in accord with the traditions of both modern science but also the transdisciplinary practices of sustainability science and neuro-architecture for example). The recent enlivenment of this ancient knowledge is referred to as 'Maharishi Vedic Science'. [For a fuller and more complete account of Maharishi Vedic Science, see Maharishi, 1994, 1995a, 1995b, 1995c, 1995d, 1996.] The applicability of Maharishi Vedic Science to resilience and sustainability has also been recently examined and well documented in the published literature. For example, Fergusson, Wells and Kettle (2017a) identified the following six principles of sustainability in Maharishi Vedic Science:

> **Principle #1:** From the *Yoga Sūtras* (2.16), do not perform actions which potentially lead to an unsustainable, catastrophic future and only then try to correct them but prevent social and environmental problems before they begin;
>
> **Principle #2:** By connecting the 'parts' of life (such as specific thoughts or actions of individuals through to the behaviour of companies or government policy formation) to the 'wholeness' of life in the unified

field of Natural Law, the field of pure consciousness or pure intelligence, pollution-free progress can be maintained in society;

Principle #3: By taking recourse to the unified field of Natural Law, the level of pure consciousness or pure intelligence, individuals can align their thinking and behaviour to the self-sufficient, self-perpetuating, infinitely balanced level of life, a level of life which is never depleted, the level of true sustainability;

Principle #4: Life lived in accord with Natural Law—lived in higher states of consciousness—is a progressively sustainable life;

Principle #5: Due to the reciprocal nature of Natural Law, if a society lives in accord with the laws of nature and does not violate the basic principles of sustainable living then Natural Law will support its efforts and the result will be progress in society; and

Principle #6: As coherence, order and balance are created in both the individual consciousness of its citizens and in the collective consciousness of society, the sustainable qualities of the unified field of Natural Law are naturally displayed in the pollution-free progress of society as a whole.

Wells, Fergusson, Kettle and Bonshek (2018) went on to examine Maharishi Vedic Science in the context of climate change, and Fergusson, Kettle and Wells (2017) pointed out the theories driving sustainability science are embedded in Indigenous history and show that many ancient traditions concerned themselves with sustainable and ethical living. Among the traditions identified with environmental stewardship are Aboriginal and Torres Strait Islanders of Australia and Māori of New Zealand. Of interest in an Indigenous context is the Vedic tradition, a tradition of sustainability and ecological awareness which has since times immemorial identified the source of sustainability in Natural Law, the universal source of tradition, language, and knowledge. In addition to surveying Aboriginal and Torres Strait Islander and Māori Indigenous traditions as they relate to environmental stewardship, the authors also explored their relation to Maharishi Vedic Science.

Fergusson, Wells and Kettle (2017b) examined Maharishi Vedic Science in light of the personal, social and environmental sustainability of Jainism, noting that the Jain tradition of ecological awareness has its roots

in Indian sustainability history, specifically in texts such as the *Tattvārtha Sūtra* and *Ācārāṇga Sūtra*. Jainism includes long-standing theory and practice of personal, social and environmental sustainability, addressing such views as the interconnectedness of humans and the laws of nature, the interdependence of everything in the universe, the responsibility of humans to conserve and preserve natural resources, the avoidance of wanton and unnecessary waste generation, and a general aversion to mistreating or abusing the environment. Similarly, Maharishi Vedic Science makes a compelling case for establishing the unity of human life with nature and for promoting actions which guarantee both the protection of nature and protection by it, and thus the relationship between the principles of sustainability in Jainism and the corresponding viewpoint of Maharishi Vedic Science is a compelling one. Most relevant to this current paper on urban resilience is the work of Kettle (2018) who explored the relationship of Maharishi Vedic Science to fulfilment of urban sustainability, and Kettle, Fergusson and Wells (2018) who presented a Unified Field Chart of urban sustainability, as shown in Figure 1.

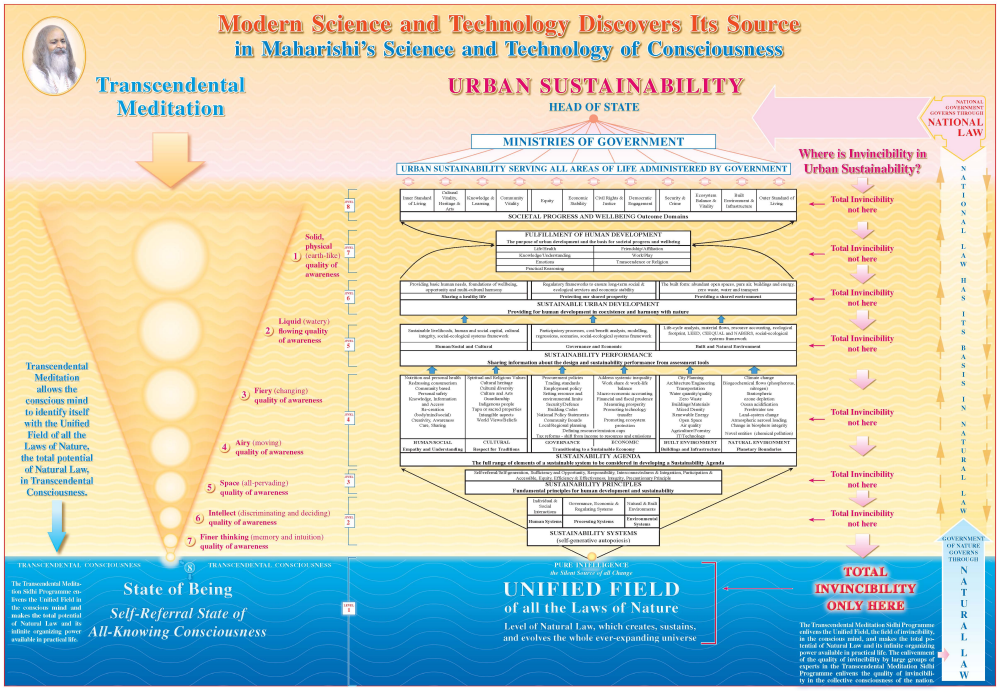
Modern Science and Technology Discovers Its Source
in Maharishi's Science and Technology of Consciousness
Transcendental Meditation
URBAN SUSTAINABILITY
HEAD OF STATE
MINISTRIES OF GOVERNMENT
URBAN SUSTAINABILITY SERVING ALL AREAS OF LIFE ADMINISTERED BY GOVERNMENT
Where is Invincibility in Urban Sustainability?
NATIONAL LAW
Total Invincibility not here
SOCIETAL PROGRESS AND WELL-BEING Outcome Domains
FULFILLMENT OF HUMAN DEVELOPMENT
SUSTAINABLE URBAN DEVELOPMENT
SUSTAINABILITY PERFORMANCE
SUSTAINABILITY AGENDA
SUSTAINABILITY PRINCIPLES
SUSTAINABILITY SYSTEMS
Transcendental Meditation allows the conscious mind to identify itself with the Unified Field of all the Laws of Nature, the total potential of Natural Law, in Transcendental Consciousness.
Solid, physical (earth-like) quality of awareness
Liquid (watery) flowing quality of awareness
Fiery (changing) quality of awareness
Airy (moving) quality of awareness
Space (all-pervading) quality of awareness
Intellect (discriminating and deciding) quality of awareness
Finer thinking (numery and intuition) quality of awareness
TRANSCENDENTAL CONSCIOUSNESS
State of Being
Self-Referral State of All-Knowing Consciousness
PURE INTELLIGENCE
the Silent Source of all Change
UNIFIED FIELD
of all the Laws of Nature
Level of Natural Law, which creates, sustains, and evolves the whole ever-expanding universe
TOTAL INVINCIBILITY ONLY HERE
GOVERNMENT OF NATURE GOVERNS THROUGH NATURAL LAW
NATIONAL LAW HAS ITS BASIS IN NATURAL LAW

Figure 1: Unified Field Chart of Urban Sustainability (source: Kettle, Fergusson, & Wells, 2018).

A Unified Field Chart is an educational tool conceived and introduced by Maharishi to systematically connect the parts of knowledge to the wholeness of knowledge and the wholeness of knowledge to the Self, to the consciousness of everyone. In the case of urban sustainability, Kettle et al. (2018) displayed the systems, principles and processes of conceiving, designing, building and living in a sustainable, healthy urban environment, the goal of which is the fulfillment of human development and the sustainable progress and well-being of society with its source of sustainability in the unified field. These authors collectively concluded that Maharishi Vedic Science increased resilience and sustainability, and that when its theory and practice are applied to contemporary living the result is a more productive, constructive, and positive future for humanity.

One of the most fundamental ways, according to Maharishi, to achieve resilient urban environments is through Maharishi Vedic Architecture, and through the design and implementation of Maharishi Vedic Garden Cities and Maharishi Vedic Gardens, the three remaining topics of this paper.

However, at the basis of each of these topics and at the core of Maharishi Vedic Science is the application of his Transcendental Meditation and TM-Sidhi program to develop the full creative potential of individuals, thereby fulfilling the need for social change agents who can visualise a better future and act with resourcefulness, who can organise and re-organise and be rapidly responsive, and who can learn, adapt and transform themselves and, through them, their communities, society and environment. If the most urgent paradigm shift required by our urban planet is that of a shift in human consciousness, Maharishi's declaration that his program develops the consciousness of the individual, resulting in the growth of higher states of consciousness, in which individuals display higher levels of creativity, intelligence, moral reasoning and judgement, field independence and locus of control, among other important cognitive and affective attributes, is significant.

Maharishi also pointed out that such individuals display an ability to adapt while remaining stable within themselves (Maharishi European Research University, 1982), precisely the characteristics needed in social change agents when under pressure to change and respond rapidly to disruption and who are mentally resourceful. Research findings from multiple sources support such a claim (Dillbeck, 2011, 2013). More importantly in the present context, Maharishi Vedic Science also provide practical knowledge and applied techniques for creating more resilient and sustainable urban environments (Fergusson & Bonshek, 2019), as will be discussed in the following sections.

MAHARISHI VEDIC ARCHITECTURE

Maharishi Vedic Architecture satisfies the need to further our understanding of the relationship between built environments and individual and collective health and well-being, to design buildings and cities to better reduce urban crime, and to make cities less susceptible to economic and governance inequities and inadequacies by reducing the size of cities and organising them in ways which are more sustainable, including making them cleaner and less polluted, while generating less waste, and thereby have a reduced adverse impact on natural environments and ecosystem services.

This system of architecture has been amply explained in a series of documents which detail the approach more fully than can be contemplated in this paper (e.g., Bonshek, 2001; Bonshek & Hamill, 2017; Fergusson et al., 1990; Hartmann, 2015; Institute of Vedic Architecture and City Planning, 2019; Maharishi Vedic University, 1998). In the 1990s Maharishi defined Maharishi Vedic Architecture as the most ancient and complete system of architecture and planning according to the solar, lunar, and planetary influences on earth, and with reference to the north and south poles and the equator. At the heart of this system of architecture was the concept of individual and collective well-being: "Health, happiness and fortune are all influenced by orientation in buildings" (Maharishi Vedic University, 1998, p. 1), Maharishi pointed out, and thus Vedic Architecture is one of "five pillars" (p. 2) of his approach to health.

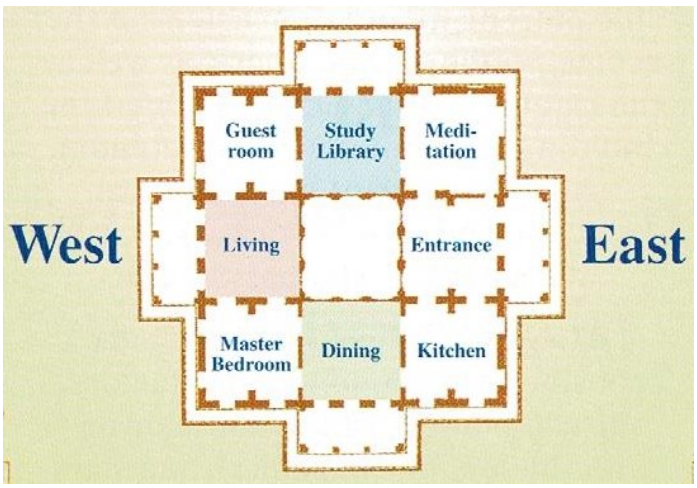

Figure 2: Example plan of a home designed according to Maharishi Vedic Architecture (image sourced from Maharishi Vedic University, 1998, p. 6).

According to Maharishi, the "strongest influence of Natural Law on earth comes from the sun. On its path from east to west, the sun generates different qualities of energy" (p. 4). Every building would, through Maharishi Vedic Architecture, be "so designed that the different energies of the sun correspond to the specific function and activity for each room. Then Natural Law always supports every aspect of our daily activity" (p. 5). This correspondence has been shown in Figure 2.

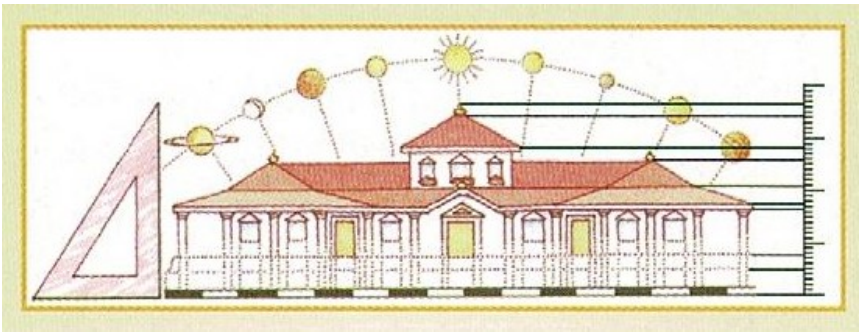

Figure 3: Height and angle of home design according to Maharishi Vedic Architecture (image sourced from Maharishi Vedic University, 1998, p. 7).

Figure 2 shows, for example, "the dining room should be located where digestion will be most healthy [i.e., on the south side of the home]. The study should be located where the intellect will be most lively [i.e., on the north side]. The living room should be located where social life will enjoy greatest support [i.e., on the west side]" (p. 6). Figure 3 goes further to schematically show that building design should also consider the height of the building and its angle in relation to planetary, lunar and solar bodies.

According to Maharishi Vedic University, "When a house for a particular individual is being planned, the placement and dimensions of the rooms, windows, and doors, as well as the length, width, and elevation of the building, are individually calculated, using the ancient mathematical formulas of *Vāstu Vidya* of Maharishi Sthāpatya Veda.

These Vedic formulas take into account consideration, among other factors, the relationship of the house owner with the sun, moon, planets, and stars to ensure a perfect resonance between the Cosmic structures and all components of the house" (p. 7). In the language of Maharishi Vedic Science, Vāstu Vidya is a name given for the 'knowledge [Vidya] of establishing (Vāstu) a building with such proper orientation, placement, and dimensions.

Figure 4: Eight cardinal and intercardinal directions of home design and their influence according to Maharishi Vedic Architecture (image sourced from Maharishi Vedic University, 1998, p. 13).

Audet (2014, 2016) and others (e.g., Institute of Vedic Architecture and City Planning, 2019, pp. 202-211) have explained in considerable detail the mathematics of Vedic architecture, particularly the principles of planning and design in light of group theory, showing the fundamental importance of symmetry at the basis of the Vedic measurement system. The Vedic formulae used in Maharishi Vedic Architecture are the so-called 'universal alphabet' for the built form of Natural Law. The Vedic formulae, along with correct proportions, placement, orientation, and location of buildings according to the principles of Maharishi Vedic Architecture, create a 'universal grammar' of Vedic architecture that expresses the rhythms and completeness of Natural Law. When houses and cities are designed fully in accordance with Natural Law, they only create positive outcomes because they become an intimate part of the ecosystem itself.

According to Maharishi, what "…people do not know [is] that many misfortunes and even disease arise from lack of proper orientation of the houses in which they live and work" (Maharishi Vedic University, 1998, p. 8). Thus, from the eight general directions that a building could face, only two—east and north—produce "auspicious influences" (p. 13) and are hence acceptable to Maharishi Vedic Architecture. The influences said to arise from buildings oriented in these eight basic directions have been shown in Figure 4, among them increased creativity (Maheshwari & Werd, 2019). The principles and the rationale that support them have been

documented in considerable detail by the Institute of Vedic Architecture and City Planning (2019), Hartmann (2015), and Maharishi Vedic University (2017).

Thus, Maharishi Vedic Architecture is an age-old system of architecture that produces a form that is at once an intimate reflection of the local laws of nature while also reflecting and connecting to the larger time and distance scale laws of nature, as represented in the planetary, lunar and solar counterparts of life on earth. Moreover, Maharishi Vedic Architecture effortlessly incorporates the eco-technology language and applications associated with sustainability, including the use of solar technology and passive heating and cooling.

The sustainability embodied in dwellings built according to Natural Law creates permanence, adaptability, and resilience, and hence these houses transform an urban environment into what it should always have been: an integral part of the natural ecosystem. Thus, Maharishi Vedic Architecture it can be said brings this enriched sustainability of uniting the house and its dweller with the greater field of ecological intelligence present in the larger biophysical cycles of our planet.

Maharishi Vedic Architecture thereby fulfils the need of furthering our understanding of the relationship between built environments and individual and collective health and well-being. Moreover, as will be shown in the following section, Maharishi Vedic Architecture designs buildings and cities to better reduce urban crime by incorporating Maharishi's Transcendental Meditation and TM-Sidhi program into the daily lives of occupants (a method which has been repeatedly shown to reduce crime, accidents and violence in society), thereby making cities less susceptible to economic and governance inequities and inadequacies, and by reducing the size of cities and organising them in ways which are more sustainable, including making them cleaner and less polluted, while generating less waste, and thereby have a reduced adverse impact on natural environments and ecosystem services. These combined approaches, I propose, result from the identification technologies which account for the dynamic, non-liner nature of urban change and which contribute to the sustainable transformability of the city from within itself.

GARDEN CITIES

One approach aimed at addressing issues of crime, overcrowding, low qualities of life, and unsustainable urban design has been the innovation of garden cities, an amorphous concept said to centre on the creation of a

neighbourhood unit with traffic-free housing areas, design of housing groupings, green spaces, and townscapes evolved to form a language of community planning. These have historically been associated with the broad concept of a utopian ideal future.

From an Asian perspective, garden cities have a significantly long history, having been developed in Japan, China, Egypt, India, Singapore, with Yangon in Myanmar and the ancient "water towns" of Suzhou in China (including water towns such as Madu, Tongli, and Fengjing) being renowned for their integration of urban design with gardens and temples (Bonshek & Hamill, 2017, p. 385). Even ancient Peking, particularly its Forbidden City, had conceptual elements of the garden city, as shown in Figure 5 (right). Indeed, the water cities of Asia have evolved more recently in China into their contemporary versions as sustainable "eco-cities" (Li & Qiu, 2015).

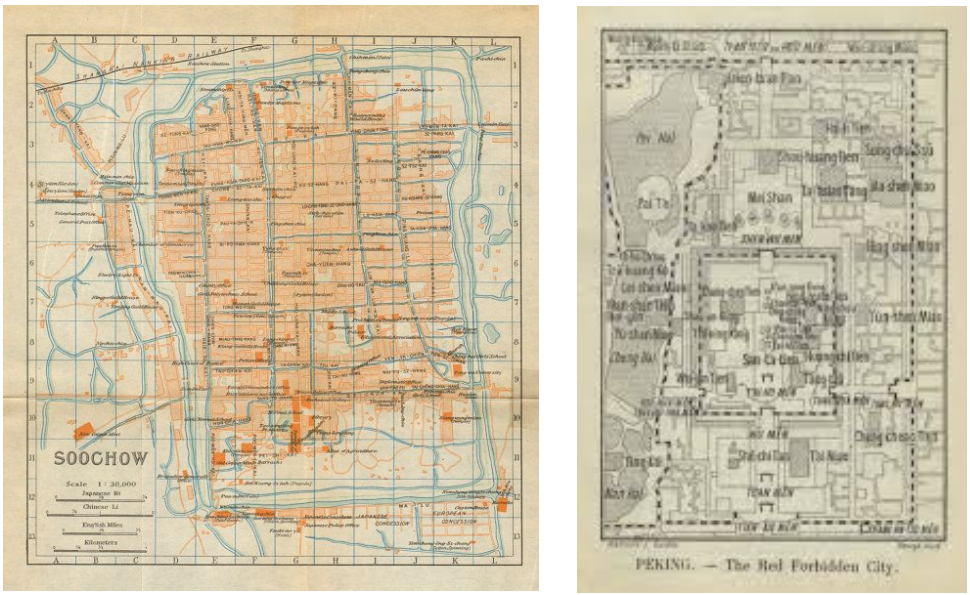

Figure 5: Water town plan of ancient Suzhou (left) and the Forbidden City in Peking (right) (image used under Creative Commons Licence).

From a western perspective, the origin of garden cities has historically been attributed to Ebenezer Howard who, in 1898, published *To-morrow: A Peaceful Path to Real Reform* (Howard, 1898), a seminal text which was reprinted in 1902 under the name *Garden Cities of To-morrow* (Howard, 1902, 2013), as shown in Figure 6 (left).

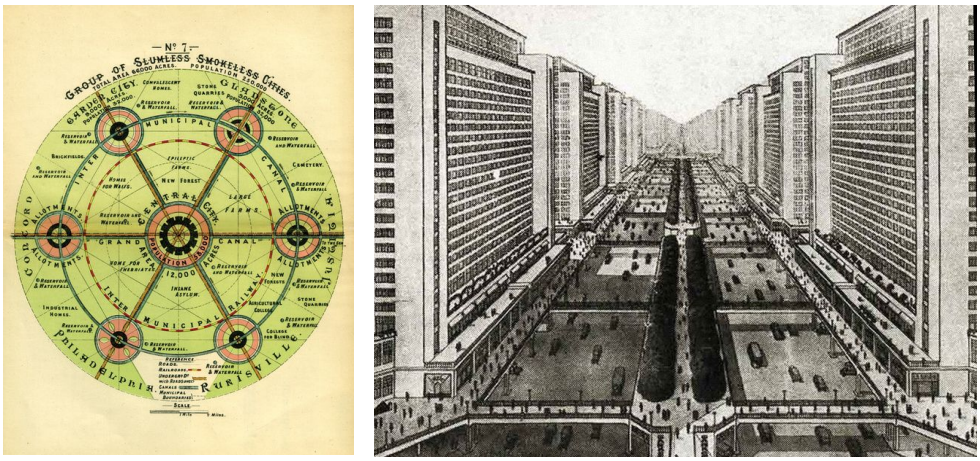

Figure 6: Howard's *Garden City of Tomorrow* (left) and Le Corbusier's *Radiant City* (right) (image used under Creative Commons Licence).

Howard's garden city at Letchworth and the contemporaneous Hampstead Garden Suburb 'for all classes' of Henrietta Barnett in London (Grafton, 1978), attracted international attention and notoriety in the early twentieth century, and were emulated around the world. Fundamental concepts approached by Howard in 1898 have for the last 120 years been consistently interrogated and reconsidered as the global population of urban inhabitants has grown (e.g., Beevers, 1988; Miller, 2001; Wheeler, 2010). In England, it is said that the garden city framework "remains valid today as the basis for the New Urbanists in the United States, and in England at Poundbury, the village extension to Dorchester promoted by the Prince of Wales" (Miller, 2001, p. 6).

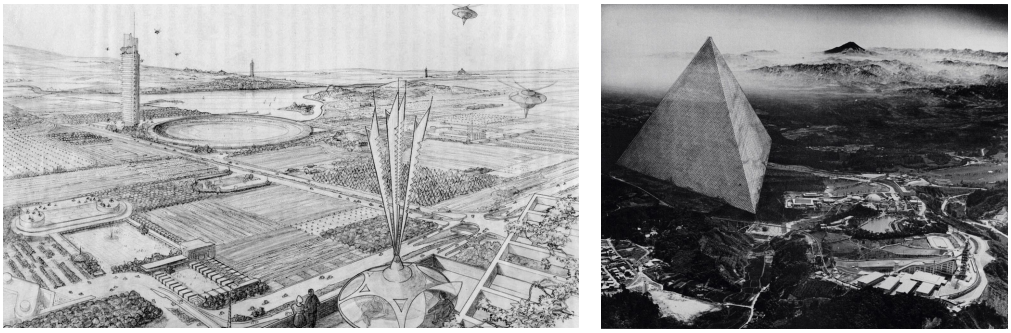

Figure 7: Lloyd Wright's *Broadacre City* (left) Fuller's *Tetrahedronal Floating City* (right) (image used under Creative Commons Licence).

Other architectural thinkers and designers took this concept forward into the twentieth century. For example, Charles-Édouard Jeanneret (popularly known as Le Corbusier, 1927) in his 'Radiant City' proposed a 'holy grail' of city planning that requires large garden plots for every urban inhabitant, whilst still maintaining high residential densities (see Figure 6 (right). In *Vers Une Architecture*, Le Corbusier expressed an unfortunate growing pragmatism of his time when he referred to the house as 'a machine to live in' (Cohen, 2006).

Indeed, the phrase "suggested a kind of machinic aesthetic that became an important concept behind the functionality, standardization and rational order that together laid the foundation of modern architecture….The idea of [architecture as] machine became a way to introduce scientific and logical reasoning as the basis of designing architecture through the establishment of standards" (Atmodiwirjo & Yatmo, 2015, p. 1).

Similarly, in 1932 Frank Lloyd Wright published his ideal garden city, *Broadacre City* (Bender, 2016) shown in Figure 7 (left) and Buckminster Fuller's theoretical *Tetrahedronal Floating City* was designed to be land-based or floating to accommodate one million inhabitants and provide large public gardens (Fuller, 1981), as shown in Figure 7 (right). Paolo Soleri (1969) designed his *City in the Image of Man* (Figure 8), and Duany (2010) borrowed von Humboldt's transect (refined by Scottish ecologist Patrick Geddes) and thereby provided an elegant exposition on the agrarian/urban interface.

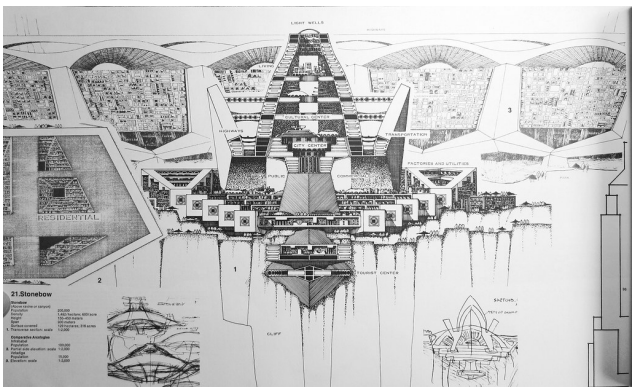

Figure 8: Soleri's *City in the Image of Man* (image used under Creative Commons Licence).

I agree that largely uncontrolled worldwide urbanisation requires a revolutionary approach to the urban forms of twenty-first century cities. The urban landscape is, after all, basically a spatial organisation of the built form and an assortment of corridors that link these forms. However, the proposition is that Maharishi Vedic Garden Cities, designed around the fundamental principles of Maharishi Vedic Architecture, are the more balanced and holistic way to achieve this goal.

MAHARISHI VEDIC GARDEN CITIES

Recent research has documented the negative causal association between urban green space exposure and mortality, heart rate, and violence, and its positive association with attention, mood, and physical activity (Kondo et al., 2018). Similarly, more recent studies have suggested that built environments, including towns, cities, and public spaces, can increase happiness (Negami et al., 2019) and that positive emotional responses to the built environment are associated with greater life satisfaction (Mouratidis, 2019).

In Maharishi Vedic Architecture and town planning, the house is considered a microcosm of the city, and green space is fundamental. Thus, Maharishi Vedic Architecture includes city planning and gardens in accord with principles enunciated in the Vedic Literature, and provides standardised principles and designs that render the entire city a natural projection of an ecosystem, while still respecting the *Sharawadji* of the natural landscape. In this context, the Sharawadji refers to the organic, non-linear aspect of natural forms and phenomena, the so-called 'naturalism' of the world around us.

Maharishi Vedic Garden Cities specialise in organising the built form so that it becomes an integral part of Natural Law, and thereby provides an immediate solution to an otherwise incoherent landscape, as shown in Figure 9. These cities are conceived to be laid out according to the ancient prescriptions of Vedic City planning and designed as a holistic structure in harmony with Natural Law. Comprised of buildings and gardens designed from the ground up to not only be as self-sufficient as possible and in harmony with Natural Law, but also to be sustainable in terms of energy, water, food, and waste treatment.

Maharishi Vedic Garden Cities typically offer 4,000m^2 (i.e., one acre) plots, systematically and attractively laid out to provide an organic garden and orchard resource for every four to five families. These Vedic Garden Cities, and the eco-friendly concepts and practices which support them, are

designed to provide an urban environment that is a haven and a trope for Natural Law and individual and collective well-being.

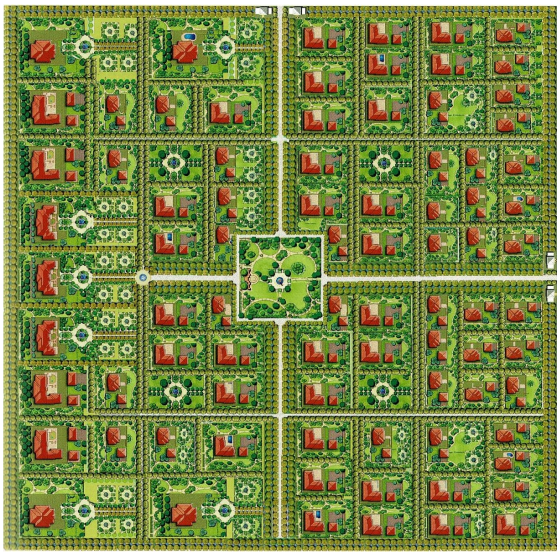

Figure 9: Generic example of a town plan for a Maharishi Vedic Garden City (image sourced from Institute of Vedic Architecture and City Planning, 2019, p. 37).

A number of Maharishi Vedic Garden Cities can be cited, including: the Maharishi Vedic University campus in Vlodrop, Netherlands; Heavenly Mountain Resort in the Blue Ridge Mountains, North Carolina; a new eco-village development in Vienna-Aspern, Austria; Mandala Village, Resort and Spa in Vero Beach, Florida; and the Spiritual Center in Nasu, Japan (called *Veda No Mori* or Forest of Veda). However, this paper will only focus on two examples: Maharishi Garden Village in Rendlesham, Suffolk, United Kingdom; and Maharishi Vedic City in Iowa, USA.

Maharishi Garden Village in Rendlesham. Maharishi Garden Village is composed of a cluster of houses aligned to a central village square, linked to a Maharishi Peace Palace (to the left, or west, of Figure 10).

Each house sits within its own space or Vāstu, surrounded by a protective fence, the "resulting gaps between dwellings contribute to the low density of the development" (Institute of Vedic Architecture and City Planning, 2019, p. 170). The houses and the town square are themselves also enclosed within its own Vāstu enclosure (top right of Figure 10).

Outside of the main enclosure are a range of different house sizes as well as low-density apartment buildings and the Peace Palace, which group practice of Maharishi's Transcendental Meditation and TM-Sidhi program takes place each day.

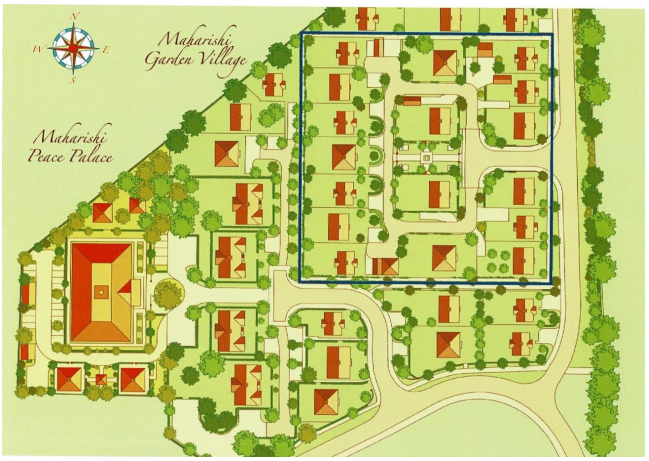

Figure 10: Plan of Maharishi Garden Village in Rendlesham (image sourced from Institute of Vedic Architecture and City Planning, 2019, p. 169).

All buildings with Maharishi Garden Village are aligned to cardinal east, with their main entrance to this direction, and "internal layouts have been carefully planned to ensure that the function of each room, such as dining, sleeping or meditating is in the right and appropriate place [within the building]" (Institute of Vedic Architecture and City Planning, 2019, p. 174). Moreover, given the Village is a landmark development in the UK, consideration was given to materials, colours of bricks, renders, roof tiles, stone features, and painted wooden and plaster surfaces.

Maharishi Vedic City in Iowa. Incorporated in the State of Iowa in 2001, Maharishi Vedic City is the first Maharishi Vedic Garden City in the United States built entirely according to the principles and practices of Maharishi Vedic Architecture. Encompassing over 800h, the City includes hotels, office buildings approximately 150 residential dwellings, two campus facilities, home to several international and non-profit organisations as well as the headquarters of privately held companies. Maharishi Vedic City has a population of approximately 1,500 in habitants.

Figure 10 presents the master plan of the main neighbourhoods in Maharishi Vedic City, with its six distinct circular *Mandala* forms and

cardinal direction alignments. Buildings in the City reflect many architectural styles, but all incorporate the design and construction elements of Maharishi Vedic Architecture. Natural building materials have been used in all construction. The City promoted "health living, harmony and peace, and boast the presence of the world class Maharishi Ayur-Veda preventive health resort and spa: The Raj. By ordinance, only organic food can be sold in the city, and the city partners with an 80,000 sq. ft. USDA-certified greenhouse operation.

Citizens meditate twice a day, practicing the Transcendental Meditation program, and are dedicated to creating world peace through increasing the number of meditators practicing together in three locations" (Institute of Vedic Architecture and City Planning, 2019, p. 179). For these reasons, it is reported, that "a Vedic Garden City, in which [Maharishi Vedic Architecture], Yoga and Ayur-Veda are coming together, provides the most fertile ground for a holistic wellness lifestyle" (p. 187).

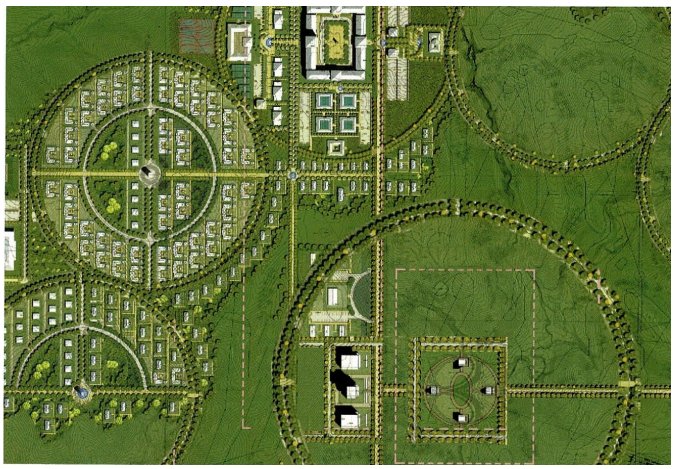

Figure 10: Master plan of Maharishi Vedic City in Iowa, USA (image sourced from Institute of Vedic Architecture and City Planning, 2019, p. 179).

Shane (2005) noted that the city is paradoxically both an ecological threat and the best hope of survival for the great many people now living on earth. Maharishi Vedic Garden Cities resolves Shane's paradox, by removing the ecological threat, and then garden cities become a means to culture individual and collective well-being. These sentiments are echoed by Solomon (2006) in his *Global City Blues* when he says the making of places for humans is important work because what they live in matters to the

health, the happiness and the well-being of each of these fragile, complex and amazing of all creatures. International Human Dimensions Programme (IHDP, 2005) notes that humans are causing environmental changes, are affected by them, but they are also the only ones who can address the changes. IHDP goes on to say that there is no way to address these challenges without altering human behaviour, both individually and collectively. Humans and their responses to the environment and ability to manage it are the other key element of the urban resilience framework.

The social change agents of Maharishi Vedic Garden Cities contribute something unique to urban environments: they collectively practice Maharishi's Transcendental Meditation and TM-Sidhi program to generate an influence of positivity, coherence, balance and order to their city and broader environment. Called the *Maharishi Effect*, this collective or group effect, promulgated from the increased brainwave coherence of each practitioner and magnified by the group practicing together in the same place at the same time, has been found to effectively reduce anxiety, depression and anti-social behaviour of the individual while also reducing crime and violence, accidents and suicide rates, and other anti-social behaviour throughout a society when enough practitioners are together. These findings have been presented in a range of important collected research documents (Chalmers, Clements, Schenkluhn, & Weinless, 1989a, 1989b, 1989c; Dillbeck, 2011, 2013; Orme-Johnson & Farrow, 1977; Wallace, Orme-Johnson, & Dillbeck, 1990).

These findings show the regular practice of Transcendental Meditation and its advanced TM-Sidhi program can not only develop the key capacities associated with human social agents of resilience, but also highlight the efficacy of Maharishi's technologies of consciousness in reducing societal tension when practised together in a group, thereby producing a powerful influence of resilience of the entire city and nation.

MAHARISHI VEDIC GARDENS

According to the Vedic Literature, "any action without knowledge, or work without understanding, is fruitless. Knowledge alone is the highest action" (*Shilparatnakosha*, 476). Thus, the Maharishi Vedic Garden, called *Udyānavidyā* in Maharishi Vedic Science, is a "garden of knowledge" (Maharishi Foundation International, 2018, p. 3), specifically knowledge of Veda and the Vedic Literature and its application to plants and gardens.

A Maharishi Vedic Garden is laid out according to the four cardinal directions: north, south, east, and west, and the four intermediary cardinal

directions: northeast, northwest, southeast and southwest. Each of these eight directions are "associated with one of seven planets, except for the southwest corner, which is associated with the ascending and descending lunar nodes (*Bṛihat Jagat*, II.5). Each planet, guided by specific values of Natural Law, influences all of nature, determining the quality of plants and their colour, structure, taste, and fragrance" (Maharishi Foundation International, 2018, p. 6).

Such an approach to gardening extends to include what has been called Maharishi Vedic Organic Gardening, which is the "process of becoming familiar with and upholding the intimate relationship on many levels of Nature's functioning, creating a wholeness, a fullness, that spreads throughout the universe from any one garden plot. [Thus], Maharishi Vedic Gardens highlight and uphold fundamental laws of nature in the design of small and large gardens, public parks, and forest gardens" (Maharishi Foundation International, 2018, p. 6). Maharishi Vedic Gardens extend to include Maharishi Vedic Organic Agriculture (Konhaus, 2011; Konhaus & Konhaus, 2017) and the rejection of genetically-modified food and other genetically-modified organisms (Fagan, 2011), the fundamental knowledge of which in Maharishi Vedic Science is called *Vṛikshāyurveda*, the science of plant life and the development and maintenance of gardens.

As a result of these and other Vedic injunctions, a Maharishi Vedic Garden can be thought of in terms of eight inner sectors or areas according to the following divisions: the garden in the east is associated with warmth in the morning and with *Ṛik Veda*; the garden in the south is associated with warmth at midday and with *Yajur Veda*; the garden in the west is associated with warmth in the afternoon and with *Sāma Veda*; and the garden in the north is associated with the "softness of the sun throughout the day [which] has an enriching influence" (Maharishi Foundation International, 2018, p. 31) and is associated with *Atharva Veda*. "A pond may be constructed holding the reflection of the garden in its extremely clear water, appearing like a garden growing in the midst of water. At other places a pond may be planned looking as though filled with abundance of the moon rays, leaving the existence of water only to be guessed" (*Vṛikshāyurveda*, 296) (Maharishi Foundation International, 2010, p. 47).

The core principles of Maharishi Vedic Gardens, as associated with the garden's directions, can be are guided by the ancient Vedic Literature. For example: *Mārkaṇdeya Purāṇ* (CII,16) states "The Ṛik [Veda] hymns give warmth in the forenoon" (p. 9); *Mārkaṇdeya Purāṇ* (CII.16) states "The Yajur [Veda] hymns truly [give warmth] at midday" (p. 17); *Mārkaṇdeya Purāṇ* (CII.16) states "The Sāman [Veda] hymns give warmth in the

afternoon" (p. 25); *Vṛikshāyurveda* (28) states "[The] shadow of no tree of any kind should fall on the house. Even a gold-yielding tree should not be planted at the entrance of the house" (p. 10); *Vishvavallabha* (CIII,24) states "All trees, creepers, bushes that yield flowers and all those which are known to produce fruits, medical plants, as also *Akra* [i.e., common vetch or tare, *Vicia sativa*] and other trees, should be grown in the home garden" (p. 12); and *Vṛikshāyurveda* (22) states "by planting all kinds of other trees, useful fruits and flowers, a person gets a reward of a thousand cows adorned with jewels" (p. 13).

The Maharishi Vedic Garden also incorporates an outer 'forest garden' based on the Vedic injunction from *Vṛikshāyurveda* (97) which states: "Trees alone on the earth give happiness both here and hereafter. Since they 'save' from abject poverty they are named 'Taravah' [i.e., the saviours]" (Maharishi Foundation International, 2018, p. 41). "Knowing this truth", the *Vṛikshāyurveda* (8) goes on to say, "one should undertake planting of trees, since trees yield the means of attaining *Dharma*, *Artha*, *Kāma*, and *Moksha* (the four aims of life)" (p. 43). According to the Vedic Literature, the laws of nature "rejoice always in the vicinity of forests, rivers, mountains, and waterfalls, as well as towns abounding in pleasure gardens" (*Varāhamihira's Bṛihat Saṁhitā*, I.LVI.6) (p. 45).

The Maharishi Vedic Garden therefore has multiple purposes: it can provide shade and cooling to the dwelling and its inhabitants at different times of the day; it can contribute to the creation of a beautiful environment of colour and sweet fragrance; it can provide food and medical plants and herbs; and it can even apparently be the means of attaining truth, purpose in life, fulfilment of desire, and spiritual liberation (i.e., Dharma, Artha, Kāma, and Moksha).

However, perhaps most importantly, the Vedic Literature also says that "a man's life has its fulfilment only when he renders service to the various other beings in the world. The elders say that the life of him who does not do so is purposeless. Hence, it is that by all means birds should be looked after affectionately" (*Mriga Pakshi Shastra* [the science of animals and birds], II.22 and II.25-26) (Maharishi Foundation International, 2018, p. 42).

CONCLUSION

An urban population tsunami, with its well-documented consequences for humankind, is approaching on a trajectory that can only be diverted by immediate and determined action. Maharishi Vedic Science provides the

means whereby the beneficial aspects of this trajectory can be maximised and focused. For this reason, it can reasonably be proposed that Maharishi Vedic Architecture, as applied to Maharishi Vedic Garden Cities and Maharishi Vedic Gardens, should be adopted as a template for new urban developments.

The resulting restoration of Natural Law to the built environment, along with the global rise in human consciousness, will restore balance to the great biophysical cycles of our planet. This is a concrete, practical and readily available solution to the collective human crisis we face as urban environments become less resilient due to overcrowding, crime and unsustainable urban design and build practices.

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